

SPECIAL PROGRESS REPORT ON THE EXPERIMENT
TO ERADICATE SCREW-WORMS FROM THE ISLAND OF CURACAO

Prepared for Members of the Livestock and Dairy Advisory Committees
by

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The screw-worm is one of the most destructive pests of livestock in the United States. It occurs each year in the Southern states and occasionally migrates, or is spread through shipment of infested animals to other parts of the country. It is believed the committee members will be interested in the latest information on the unique and interesting experiment that is being conducted to determine the possibility of eradicating the screw-worm by releasing laboratory-reared flies which have been made sterile by exposure to gamma rays.

The Entomology Research Branch, ARS, has been investigating this method of control for this pest for several years. The results of preliminary research were sufficiently promising to warrant a "pilot" size experiment. Because of extensive migration of the insect, it was not possible to conduct such an experiment on a small scale in screw-worm-infested areas in the United States. A small isolated island was desired to permit experiments with available personnel and facilities. The Island of Curacao, one of the Netherlands Antilles in the West Indies, was found to be suitable for the investigations. A cooperative program was developed with the Netherlands government and work was started in April of this year.

Curacao covers 170 square miles. Vegetation and topography are similar to parts of Southwest Texas or Arizona. Thousands of goats inhabit the island and a few wild animals are also present. The screw-worm is native on the island and infests animals throughout the year. At the beginning of the current experiment the fly population was very high--perhaps much higher per unit area than in Southeastern United States.

Flies for release are reared on artificial medium in the laboratory at Orlando, Florida, and the pupae are sterilized by gamma rays in a specially constructed unit made available by the Oak Ridge National Laboratory. The pupae are shipped twice a week to Curacao via commercial airlines. When the flies have emerged they are dispersed systematically over the island from a small airplane.

The male flies which have been exposed to gamma rays are essentially normal except that they are sterile. They mate readily with normal unmated female flies in the screw-worm area. Such matings with sterile males result in deposition of infertile eggs by the wild native females. In fact, when a sterile male mates with a wild fertile female such female for all practical purposes is destroyed. The object, therefore, is to release sufficient numbers of sterile males to cause a reduction in the population of wild

fertile females. Such releases of sterile males are continued at the same rate for a period of months. As the number of wild screw-worms decreases the continued release of a constant number of sterile males results in progressive increase in effectiveness.

In the Curacao experiment releases of relatively small numbers of sterilized screw-worm flies were begun in April 1954 for the purpose of estimating the abundance of wild flies on the island and to aid in establishing the best procedure to follow in treating and releasing the sterile flies.

Beginning August 1 the eradication attempt was started. Approximately 400 males per square mile per week were released in an all-out effort to eradicate the native screw-worm population. In order to determine if the released flies were reducing the natural screw-worm population, goats have been maintained at strategically located pens on the island. Approximately 150 egg masses per week were obtained on these goats when the experiment to eradicate the flies was started.

The release rate of 400 sterile males per square mile per week was sufficient to mate with about 70 percent of the wild native females present during the first month. This caused a rapid downward trend in the number of wild native screw-worm flies on the island. During the early part of the second month up to 90 percent of the eggs deposited by the wild females were sterile, and the population of wild flies continued to show a marked reduction. By late September or in about two months the fly population was reduced to the point where only 10 egg masses were obtained on the wounded goats. With so few remaining wild flies there was such preponderance of released sterile males that all of the eggs were sterile. During the first 10 days of the third month (October 3-13) no egg masses were collected on the wounded goats. It seems therefore, that the screw-worm has almost been eradicated. The release of sterile males is continuing, however, and they will be continued until we are certain that the insect is eliminated from the island.

The results thus far are exceptionally promising and we are of the opinion that continued releases for another month or two will assure attainment of the objective. If this is accomplished, serious consideration should be given to the next phase of the program which involves an expanded research effort with the objective of determining the most feasible and practical procedures to follow in eliminating the screw-worm from the Southeast United States.

An eradication program for the Southeast would be a huge undertaking. We believe, however, that the method when fully perfected offers a practical way to achieve eradication of the pest which livestock interests have been requesting.

The research on this new and highly interesting approach to insect control, originally supported and encouraged by the Livestock Advisory Committee, has progressed satisfactorily. With the successful completion of the first phase of the research program, several lines of research should be pursued to perfect and adapt the method for large-scale operations: (1) a more efficient and less costly medium for mass rearing of millions of flies is

needed; (2) a simple positive method of determining the abundance of screw-worm flies in various areas is essential; (3) the most effective and most economical procedures for releasing irradiated screw-worm flies on an area as large as a state must be developed; (4) a large "pilot" test on the Florida mainland in an area of about 50 miles in diameter should be conducted to determine limitations under Florida conditions and to test large scale methods that need to be developed.

When your committees meet, representatives of the Entomology Research Branch, Agricultural Research Service, engaged in this research program, are prepared to discuss in more detail the research under way on this project.

